Rodagon, Rodagon-WA

Where an investment in quality gives the greatest gain

The quality possible with modern cameras, film, and processing frequently is much higher than the final print quality as photographers frequently may try to "save" by economizing on their enlarging lens and therefore not reproducing all that the original is capable of.

People often spend a lot of money on high-quality camera lenses. But the enlarging lens is just as important a link in the image transfer chain. And although the increased cost of a high-quality enlarging lens is relatively small, it will lead to a clearly visible gain in quality which will benefit the pictures taken with **all** camera lenses!

Standard film sizes for printers and enlargers

Size / Film designation	Format size*	Diagonal*
Minox format / Minox film	8×11 mm	13.6 mm
Pocket format / Pocket film "110"	13×17 mm	21.4 mm
Half frame 35 mm	18×24 mm	30.0 mm
APS Classic format "C" / APS film	16.7×25.0 mm	30.1 mm
APS Panorama format "P" / APS film	10.7×30.2 mm	32.0 mm
APS Full format "H" / APS film	16.7×30.2 mm	34.5 mm
Instamatic format / Instamatic film "126"	28×28 mm	39.6 mm
Full frame 35 mm	24×36 mm	43.3 mm
4.5×6 cm / Roll film "120" and "220"	42×56 mm	70.0 mm
6×6 cm / Roll film "120" and "220"	56×56 mm	79.2 mm
6×7 cm / Roll film "120" and "220"	56×68 mm	88.1 mm
6×9 cm / Roll film "120" and "220"	56×81 mm	98.5 mm
9×12 cm / Sheet Film	83×114 mm	141.0 mm
4×5" / Sheet Film	96×120 mm	153.7 mm
13×18 cm / Sheet Film	122×171 mm	210.1 mm
5×7" / Sheet Film	121×170 mm	208.7 mm
18×24 cm / Sheet Film	171×231 mm	287.4 mm
8×10" / Sheet Film	194×245 mm	312.5 mm
24×30 cm / Sheet Film	230×290 mm	370.0 mm
10×12" / Sheet Film	245×295 mm	383.5 mm

* The masks of the printers and their diagonals are slightly smaller.

Worldwide, Rodenstock has the enviable reputation for making excellent enlarging lenses for all film formats. The six-element premium Rodagon and Rodagon-WA lenses in particular are highly respected. The focal lengths range from 28 mm to 360 mm and cover all film sizes from Minox and Pocket to the largest, standard sheet films 8x10" (18 x 24 cm).

High-quality all-round lenses for mini-lab and high-speed lab printers

The Rodenstock Rodagon and Rodagon-WA lenses offer the quality-conscious user the highest imaging quality; sharpness, contrast and correction of distortion are so high that many demanding amateur and professional photographers prefer these lenses which were actually designed for enlarging, over special macro-lenses for close-up shots.

In addition, the Rodagon and Rodagon-WA are characterized by their equally high performance over the image field (from the center to the extreme corners) and over their very wide scale ranges. This makes them true all-round lenses and increases the price/performance ratio to a very favorable level.

The quality of the mount mechanics is easily equal to that of the optical system. The 0 size mounts offer special features like a pre set aperture function and aperture settings which can be switched between infinite adjustment and half-stop click stops.

The pre-set aperture can be switched quickly and precisely from full aperture to a previously selected working aperture. The infinite adjustment setting permits precise adjustments of the exposure for a given exposure time (an important requirement for the use of analyzers). The mounts in sizes 0 to 3, that is all lenses 40 mm and longer also offer a diaphragm display lit by the light from the enlarger head to simplify adjustments in the dark.

Rodagon
The six-element Rodenstock Rodagon offers brilliant image reproduction over the entire scale range of commercial enlargers and printers and is the best choice for professional print quality in amateur and professional labs. It guarantees the resolution of even the finest details, with high and uniform contrast from the image center to the corner. Its high insensitivity to scale ensures premium quality from small sizes up to poster prints.

The recommended working aperture is reached by stopping down only two stops (see corresponding second MTF diagram on the data sheet pages).

Because the Rodagon also meets the very high demands for macro, many photographers also use it for high-quality photos in the close-up range.

Rodagon-WA
The Rodenstock Rodagon-WA, also with six elements, is characterized by a larger image angle made possible without any loss in imaging quality by the use of special glass types. At larger image angles, a shorter focal length than usual can be used for the same film size so that while the same distance is kept between film and paper plane, the print size is increased by about 30%.

The Rodagon-WA is therefore eminently suitable for enlargers with relatively short columns so that large print sizes can still be obtained. It is also recommended when enlargements are required which are so big that other lenses would require wall or floor projection. One of the handling advantages is that thanks to the shorter projection distances, the negative carrier and filter adjustments of the enlarger are much lower and easier to operate; the filter scales can also be read more easily.

With the Rodagon-WA the recommended working aperture for the best quality over the whole size range is reached by stopping down two stops (see second MTF diagram in each case on the data sheet pages).

As a close-up taking lens in combination with the "Modular-Focus" (see also page 6), the Rodagon-WA's large image angle provides high image circle reserves for the compensation of "converging lines" when taking photos using a shift adapter. The Rodagon-WA 60 mm f/4 or 80 mm f/4 is practically predestined for such photos in the 35 mm film size.

Modulation transfer function (MTF) as a demonstration of quality

The high imaging quality of Rodenstock lenses is documented in the MTF curves and diagrams for relative brightness loss, distortion and longitudinal chromatic aberration on the following data sheet pages.

The MTF curves show the contrast of fine grating structures in dependence of the image height (0 = center, maximal value = image circle circumference). The "sagittal" curves to structures running tangentially or in circular form around the image circle center. The upper curve pair applies to the lowest spatial frequency (lp/mm = line pairs per millimeter), the lowest to the highest. The format-dependent spatial frequencies are given over the MTF diagram (e.g. for 35 mm 10 lp/mm to 80 lp/mm).

The top diagram applies to the open aperture, the bottom for the recommended working aperture (stopped down two stops). The higher the curves are and the less they fall off towards the edge, the better it is. While diffraction sets physical limits to the imaging quality, the Rodagon and the Rodagon-WA come incredibly close to the limits in their performance.

The relative drop in brightness shows how uniformly the image field is illuminated. With an open aperture, the edge brightness due to mount vignetting falls dramatically; stopping down by one stop eliminates vignetting almost completely, and stopping down by two stops will put the brightness right at the physical limit (curve "I cos").

contact area to rear edge	Effective focal length ±0.5%	Principle Point distance HH	Entrance pupil Ø (EnP)	Exit pupill Ø (ExP)	EnP-ExP ratio	Front vertex to EnP	ExP to back vertex
g						h	i
6.7 mm	27.6 mm	0.04 mm	6.7 mm	7.1 mm	0.95	7.6 mm	7.8 mm
9.0 mm	35.1 mm	0.11 mm	8.7 mm	9.3 mm	0.94	9.7 mm	9.6 mm
13.0 mm	50.2 mm	- 2.75 mm	17.4 mm	18.1 mm	0.96	13.8 mm	20.8 mm
10.0 mm	61.7 mm	- 1.92 mm	15.4 mm	15.4 mm	1.00	17.8 mm	15.0 mm
13.5 [illegible]	81.1 mm	- 2.46 mm	20.3 mm	20.3 mm	1.00	23.3 mm	19.8 mm
10.5 mm	106.4 mm	- 1.65 mm	18.7 mm	18.5 mm	1.01	19.6 mm	15.9 mm
14.5 mm	135.7 mm	- 2.45 mm	23.8 mm	23.5 mm	1.01	25.1 mm	20.7 mm
20.1 mm	150.4 mm	- 2.35 mm	26.3 mm	26.1 mm	1.01	27.7 mm	22.6 mm
24.6 mm	182.6 mm	- 3.22 mm	32.0 mm	31.7 mm	1.01	33.7 mm	27.7 mm
28.1 mm	206.4 mm	- 3.55 mm	36.1 mm	35.9 mm	1.01	37.8 mm	31.3 mm
30.0 mm	238.0 mm	- 3.85 mm	41.7 mm	41.4 mm	1.01	42.9 mm	35.7 mm
8.5 mm	291.5 mm	- 4.70 mm	51.1 mm	50.7 mm	1.01	52.4 mm	43.5 mm
9.5 mm	347.2 mm	- 5.98 mm	55.2 mm	55.2 mm	1.00	59.8 mm	55.4 mm
6.5 mm	40.5 mm	0.17 mm	10.1 mm	10.7 mm	0.94	11.2 mm	11.0 mm
10.0 mm	61.4 mm	- 2.44 mm	14.9 mm	15.3 mm	0.98	15.7 mm	16.1 mm
13.0 mm	82.6 mm	- 2.27 mm	20.1 mm	20.3 mm	0.99	20.8 mm	19.1 mm
26.6 mm	120.7 mm	- 4.41 mm	21.5 mm	21.7 mm	0.99	2.97 mm	31.0 mm

Rodagon 1:5.6/f=210 mm

6 elements/4 groups
Mount-size 2

Rodagon-WA 1:4/f=40 mm

6 elements/4 groups
Mount-size 0

Distortion varies with the imaging scale. Even in the most unfavorable case it remains so low that it can be neglected to all practical intent for photography. With taking lenses the distortion is often several times higher.

The longitudinal chromatic deviation shows the different position of the focal point for different wavelengths (colors). When enlarging black-and-white prints, only the left third of the diagram is important, for color the whole area is relevant. Rodagon lens quality is above the level of the best taking lenses.

Fine focal length setting thanks to fitted supplementary lenses

In some applications, for example to maintain a film/paper distance required by the enlarger or the printer, it may be necessary to use a focal length not contained in the standard focal length series. For this reason, supplementary lenses are available for all Rodenstock enlarging lenses with a filter thread of E 30.5 to E 67; these lenses allow a very fine gradation of the focal length. The chart on the following page shows which focal lengths can be obtained when these supplementary lenses are used in combination with the Rodagon or Rodagon-WA lenses.

Technical Data / Mechanical and optical Data

Nominal focal length	Maxi-mum aperture	max. recommended film size	recommended scale (optimal)	Optimum reproduction scale	Mount-size	lowest aperture	pre-selection aperture	click-stop disable	illuminated stop display	filter thread [mm]	flange focal length at ∞	overall length	maximum lens dia. ∅	screw thread [mm]
										a	b	c	d	e
Rodagon														
28 mm	1:4	APS "P" (Panorama)	5× ... 30×	20×	00	16	–	–	–	M 30.5×0.5	27.7 mm	30.0 mm	40.5 mm	M 32.5×0.5
35 mm	1:4	Instamatic (126)	5× ... 30×	20×	00	16	–	–	–	M 30.5×0.5	35.6 mm	32.5 mm	40.5 mm	M 32.5×0.5
50 mm	1:2.8	35 mm film-format	2× ... 15×	10×	0	16	●	●	●	M 40.5×0.5	43.5 mm	43.5 mm	50.0 mm *	M 39×1/26"
60 mm	1:4	35 mm film-format	2× ... 10×	6×	0	22	●	●	●	M 40.5×0.5	56.0 mm	41.0 mm	50.0 mm *	M 39×1/26"
80 mm	1:4	6×7 cm	2× ... 10×	6×	0	22	●	●	●	M 40.5×0.5	74.7 mm	44.5 mm	50.0 mm *	M 3[illegible]6"
105 mm	1:5.6	6×9 cm	2× ... 10×	6×	0	32	●	●	●	M 40.5×0.5	99.5 mm	41.0 mm	50.0 mm *	M 39×1/26"
135 mm	1:5.6	9×12 cm / 4×5"	2× ... 10×	6×	0	32	●	●	●	M 40.5×0.5	128.0 mm	45.5 mm	50.0 mm *	M 39×1/26"
150 mm	1:5.6	9×12 cm / 4×5"	2× ... 10×	6×	1	45	–	–	●	M 52×0.75	145.5 mm	49.8 mm	60.0 mm	M 50×0.75
180 mm	1:5.6	13×18 cm / 5×7"	2× ... 8×	5×	1	45	–	–	●	M 58×0.75	177.0 mm	59.8 mm	60.0 mm	M 50×0.75
210 mm	1:5.6	13×18 cm / 5×7"	2× ... 8×	4×	2	45	–	–	●	M 67×0.75	201.3 mm	67.2 mm	70.0 mm	M 58×0.75
240 mm	1:5.6	18×24 cm / 8×10"	2× ... 8×	4×	3	45	–	–	●	M 77×0.75	229.5 mm	77.0 mm	80.0 mm	M 72×1
300 mm	1:5.6	18×24 cm / 8×10"	2× ... 8×	4×	3	45	–	–	●	M 86×1	253.8 mm	93.0 mm	90.0 mm	M 72×1
360 mm	1:6.3	24×30 cm / 10×12"	2× ... 8×	2.5×	3	45	–	–	●	M 95×1	300.0 mm	110.6 mm	100.0 mm	M 90×1
Rodagon-WA														
40 mm	1:4	24×36 mm	4× ... 20×	10×	0	22	●	●	●	M 40.5×0.5	36.5 mm	37.2 mm	50.0 mm *	M 39×1/26"
60 mm	1:4	6×6 cm	4× ... 15×	8×	0	22	●	●	●	M 40.5×0.5	55.5 mm	41.0 mm	50.0 mm *	M 39×1/26"
80 mm	1:4	6×9 cm	4× ... 15×	8×	0	22	●	●	●	M 40.5×0.5	77.0 mm	44.0 mm	50.0 mm *	M 39×1/26"
120 mm	1:5.6	9×12 cm / 4×5"	4× ... 15×	6×	1	45	–	–	●	M 52×0.75	116.4 mm	59.0 mm	60.0 mm	M 50×0.75

* Switch lever for half-stop clicks and infinite setting protrudes 2 mm over the mount with a diameter of 50 mm.

Lens sections at a scale of 1:1

Rodagon 1:4/f=35 mm

6 elements/4 groups
Mount-size 0

Rodagon 1:2.8/f=50 mm

6 elements/4 groups
Mount-size 0

Supplementary lenses* for smaller stage focal lengths

Nominal focal length	Maxi-mum aperture	filter thread [mm]	Supplementary lens [diopter]												
			+1.5	+1.25	+1.0	+0.75	+0.5	+0.25	without	-0.25	-0.5	-0.75	-1.0	-1.25	-1.5
			Effective focal length [mm] of the system of lens and supplementary lens, tolerance ±1%												
Rodagon															
28 mm	1:4	E 30.5	27.3	27.4	27.4	27.5	27.6	27.6	27.6	27.9	28.0	28.1	28.2	28.3	28.4
35 mm	1:4	E 30.5	34.5	34.5	34.6	34.8	35.0	35.1	35.1	35.5	35.7	35.9	36.1	36.2	36.4
50 mm	1:2.8	E 40.5	48.4	48.7	49.0	49.4	49.7	50.1	50.2	50.9	51.3	51.7	52.1	52.4	52.8
60 mm	1:4	E 40.5	58.7	59.2	59.7	60.3	60.8	61.5	61.7	62.7	63.4	64.1	64.7	65.4	66.1
80 mm	1:4	E 40.5	75.6	76.6	77.4	78.4	79.4	80.5	81.1	82.8	83.9	85.1	86.3	87.5	88.8
105 mm	1:4	E 40.5	95.2	97.1	98.8	100.7	102.7	104.8	106.4	109.4	111.9	114.4	117.0	119.7	122.6
135 mm	1:5.6	E 40.5	117.8	120.6	123.3	126.4	129.5	133.0	135.7	140.4	144.4	148.7	153.2	157.9	163.0
150 mm	1:5.6	E 52	128.4	131.7	135.0	138.8	142.6	146.8	150.4	156.1	161.1	166.5	172.3	178.3	184.9
180 mm	1:5.6	E 58	150.8	155.5	160.2	165.5	171.0	177.1	182.6	190.8	198.4	206.7	215.7	225.3	236.1
210 mm	1:5.6	E 67	166.7	172.3	178.2	184.8	191.7	199.4	206.5	216.9	226.8	237.7	249.7	262.7	277.5
Rodagon-WA															
40 mm	1:4	E 40.5	39.5	39.7	39.9	40.1	40.3	40.3	40.5	41.0	41.3	41.5	41.8	42.0	42.2
60 mm	1:4	E 40.5	59.1	59.6	59.9	60.4	60.8	61.3	61.4	62.3	62.8	63.3	63.8	64.3	64.8
80 mm	1:4	E 40.5	77.2	78.2	79.0	80.0	81.0	82.0	82.6	84.3	85.4	86.6	87.8	89.0	90.2
120 mm	1:5.6	E 52	107.8	109.9	111.9	114.2	116.4	118.9	120.7	124.2	127.0	129.9	133.0	136.1	139.5

* When a supplementary lens is used, the maximum available lens format will be restricted in accordance with the focal power of the supplementary lens

At large imaging scales, the supplementary lens mount can vignette the ray path and limit the effective format. In addition, supplementary lenses reduce imaging quality in the periphery – and the higher the diopter number the greater the reduction.

For reason of quality, it is therefore necessary to allow sufficient format reserves when selecting the lens so that vignetting or blurred edges do not impair the quality when the supplementary lens is fitted.

Rodagon and Rodagon-WA as close-up and macro lenses

The excellent imaging quality of the Rodagon and Rodagon-WA enlarging lenses is also utilized for close-up and macro shots. Here sharper results can be obtained than with macro lenses. As a focusing aid for shots with 35 mm, video or film cameras, Rodenstock offers the "Modular-Focus" with 25 mm of extension and straight-line movement. On the camera side it has an exchangeable adapter for T2, M 42, M 39 (Leica thread) and C mount.

Rodagon 1:4/f=28 mm

MTF at ratio 20x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 4.8 8.0 11.2 13.6 16.0

half film diagonal [mm]

MTF at ratio 20x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 4.8 8.0 11.2 13.6 16.0

half film diagonal [mm]

—— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 20x

------ f/ 4.0 ········ f/ 5.6 —— $1-\cos^4$

-·-·-· f/ 8.0 —·—· f/11.0

relative light fall-off [f-stops]

−1 −2 −3 −4

0.0 8.0 16.0

half film diagonal [mm]

Distortion at ratio 30x to 5x

—— M=30x ------ M=20x

········ M=10x -·-·-· M=5x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 −0.2 −0.4 −0.6 −0.8 −1.0

0.0 8.0 16.0

half film diagonal [mm]

Longitudinal color aberration at ratio 20x

longitudinal color aberration [mm]

1.00 0.50 0.00 −0.50 −1.00

438 486 534 582 630 678

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:4/f=35 mm

MTF at ratio 20x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 5.9 9.9 13.8 16.8 19.8

half film diagonal [mm]

MTF at ratio 20x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 5.9 9.9 13.8 16.8 19.8

half film diagonal [mm]

______ sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 20x

------ f/ 4.0 ········ f/ 5.6 ——— 1-cos⁴

-·-·-·- f/ 8.0 —··— f/11.0

relative light fall-off [f-stops]

-1 -2 -3 -4

0.0 9.9 19.8

half film diagonal [mm]

Distortion at ratio 30x to 5x

______ M=30x ------ M=20x

········ M=10x -·-·-·- M=5x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0

0.0 9.9 19.8

half film diagonal [mm]

Longitudinal color aberration at ratio 20x

longitudinal color aberration[mm]

1.00 0.50 0.00 -0.50 -1.00

438 486 534 582 630 678

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:2.8/f=50 mm

MTF at ratio 10x f/ 2.8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 6.4 10.7 15.0 18.3 21.5

half film diagonal [mm]

relative light fall-off at ratio 10x

------ f/ 2.8 ········ f/ 4.0 ——— $1-\cos^4$

-·-·-· f/ 5.6 —··— f/ 8.0

relative light fall-off [f-stops]

-1 -2 -3 -4

0.0 10.7 21.5

half film diagonal [mm]

MTF at ratio 10x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 6.4 10.7 15.0 18.3 21.5

half film diagonal [mm]

Distortion at ratio 15x to 2x

——— M=15x ------ M=10x

········ M=5x -·-·-· M=2x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0

0.0 10.8 21.5

half film diagonal [mm]

——— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

Longitudinal color aberration at ratio 10x

longitudinal color aberration [mm]

1.00 0.50 0.00 -0.50 -1.00

438 486 534 582 630 678

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:4/f=60 mm

MTF at ratio 6x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

MTF at ratio 6x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

—— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

relative light fall-off
at ratio 6x

f/ 4.0 f/ 5.6 1-cos⁴
f/ 8.0 f/11.0

relative light fall-off [f-stops]

half film diagonal [mm]

Distortion at ratio 10x to 2x

M=10x M=6x
M=4x M=2x

distortion [%]

half film diagonal [mm]

Longitudinal color aberration
at ratio 6x

longitudinal color aberration[mm]

wavelength [nm]

Rodagon 1:4/f=80 mm

MTF at ratio 6x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 13.2 22.0 30.8 37.4 44.0

half film diagonal [mm]

MTF at ratio 6x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 13.2 22.0 30.8 37.4 44.0

half film diagonal [mm]

———— sagittal, × Diffraction limited value

- - - - - - meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

relative light fall-off at ratio 6x

- - - - - f/ 4.0 ········ f/ 5.6 ——— $1-\cos^4$

-·-·-·- f/ 8.0 —··— f/11.0

relative light fall-off [f-stops]

-1 -2 -3 -4

0.0 22.0 44.0

half film diagonal [mm]

Distortion at ratio 10x to 2x

———— M=10x - - - - - M=6x

········ M=4x -·-·-· M=2x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0

0.0 22.0 44.0

half film diagonal [mm]

Longitudinal color aberration at ratio 6x

longitudinal color aberration[mm]

1.00 0.50 0.00 -0.50 -1.00

438 486 534 582 630 678

wavelength [nm]

Rodagon 1:5.6/f=105 mm

MTF at ratio 6x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

MTF at ratio 6x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

sagittal, × Diffraction limited value

meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

relative light fall-off at ratio 6x

f/ 5.6 f/ 8.0 1−cos⁴ f/11.0 f/16.0

relative light fall-off [f-stops]

half film diagonal [mm]

Distortion at ratio 10x to 2x

M=10x M=6x M=4x M=2x

distortion [%]

half film diagonal [mm]

Longitudinal color aberration at ratio 6x

longitudinal color aberration[mm]

wavelength [nm]

Rodagon 1:5.6/f=135 mm

MTF at ratio 6x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

MTF at ratio 6x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

———— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

relative light fall-off at ratio 6x

Distortion at ratio 10x to 2x

Longitudinal color aberration at ratio 6x

Rodagon 1:5.6/f=150 mm

MTF at ratio 6x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

relative light fall-off at ratio 6x

f/ 5.6 f/ 8.0 1-cos4 f/11.0 f/16.0

relative light fall-off [f-stops]

half film diagonal [mm]

MTF at ratio 6x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

Distortion at ratio 10x to 2x

M=10x M= 6x M= 4x M= 2x

distortion [%]

half film diagonal [mm]

sagittal, × Diffraction limited value

meridional, ⊖ Diffraction limited value

Longitudinal color aberration at ratio 6x

longitudinal color aberration[mm]

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:5.6/f=180 mm

MTF at ratio 5x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

MTF at ratio 5x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

——— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 5x

------ f/ 5.6 ········ f/ 8.0 ——— $1-\cos^4$

-·-·- f/11.0 —·—· f/16.0

relative light fall-off [f-stops]

half film diagonal [mm]

Distortion at ratio 8x to 2x

——— M=8x ------ M=6x

········ M=4x -·-·-· M=2x

distortion [%]

half film diagonal [mm]

Longitudinal color aberration at ratio 5x

longitudinal color aberration [mm]

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:5.6/f=210 mm

MTF at ratio 4x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 30.9 51.5 72.1 87.5 102.9

half film diagonal [mm]

MTF at ratio 4x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 30.9 51.5 72.1 87.5 102.9

half film diagonal [mm]

——— sagittal, × Diffraction limited value

- - - - meridional, ⊖ Diffraction limited value

relative light fall-off
at ratio 4x

- - - - f/ 5.6 · · · · f/ 8.0 ——— 1-cos⁴
-·-·- f/11.0 —·— f/16.0

relative light fall-off [f-stops]

-1 -2 -3 -4

0.0 51.5 102.9

half film diagonal [mm]

Distortion at ratio 8x to 2x

——— M=8x - - - - M=6x
······ M=4x -·-·- M=2x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0

0.0 51.5 103.0

half film diagonal [mm]

Longitudinal color aberration
at ratio 4x

longitudinal color aberration [mm]

1.00 0.50 0.00 -0.50 -1.00

438 486 534 582 630 678

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:5.6/f=240 mm

MTF at ratio 4x f/ 5.6

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

MTF at ratio 4x f/ 11

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

sagittal, × Diffraction limited value

meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 4x

f/ 5.6 f/ 8.0 $1-\cos^4$ f/11.0 f/16.0

relative light fall-off [f-stops]

half film diagonal [mm]

Distortion at ratio 8x to 2x

M=8x M=6x M=4x M=2x

distortion [%]

half film diagonal [mm]

Longitudinal color aberration at ratio 4x

longitudinal color aberration [mm]

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:5.6/f=300 mm

MTF at ratio 4x f/ 5.6

MTF at ratio 4x f/ 11

relative light fall-off at ratio 4x

Distortion at ratio 8x to 2x

Longitudinal color aberration at ratio 4x

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon 1:6.3/f=360 mm

MTF at ratio 2.5x f/ 6.3

MTF [%] at 2.5 5.0 10.0 20.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 57.0 95.0 133.0 161.5 190.0

half film diagonal [mm]

relative light fall-off
at ratio 2.5x

f/ 6.3 f/ 8.0 1-cos⁴
f/11.0 f/16.0

relative light fall-off [f-stops]

-1 -2 -3 -4

0.0 95.0 190.0

half film diagonal [mm]

Distortion at ratio 8x to 2x

M=8x M=6x
M=4x M=2x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0

0.0 95.0 190.0

half film diagonal [mm]

MTF at ratio 2.5x f/ 11

MTF [%] at 2.5 5.0 10.0 20.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 57.0 95.0 133.0 161.5 190.0

half film diagonal [mm]

Longitudinal color aberration
at ratio 2.5x

longitudinal color aberration [mm]

1.00 0.50 0.00 -0.50 -1.00

438 486 534 582 630 678

wavelength [nm]

——— sagittal, × Diffraction limited value
- - - - meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon-WA 1:4/f=40 mm

MTF at ratio 10x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

MTF at ratio 10x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

half film diagonal [mm]

______ sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 10x

half film diagonal [mm]

Distortion at ratio 20x to 4x

half film diagonal [mm]

Longitudinal color aberration at ratio 10x

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon-WA 1:4/f=60 mm

MTF at ratio 8x f/ 4

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 11.6 19.4 27.1 32.9 38.6

half film diagonal [mm]

MTF at ratio 8x f/ 8

MTF [%] at 5.0 10.0 20.0 40.0 Lp/mm

100 90 80 70 60 50 40 30 20 10 0

0.0 11.6 19.4 27.1 32.9 38.6

half film diagonal [mm]

—— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

relative light fall-off
at ratio 8x

------ f/ 4.0 ········ f/ 5.6 —— $1-\cos^4$
-·-·-·- f/ 8.0 —·—·— f/11.0

relative light fall-off [f-stops]

−1 −2 −3 −4

0.0 19.4 38.6

half film diagonal [mm]

Distortion at ratio 15x to 4x

—— M=15x ------ M=10x
········ M=8x -·-·-·- M=4x

distortion [%]

1.0 0.8 0.6 0.4 0.2 0.0 −0.2 −0.4 −0.6 −0.8 −1.0

0.0 19.4 38.8

half film diagonal [mm]

Longitudinal color aberration
at ratio 8x

longitudinal color aberration[mm]

1.00 0.50 0.00 −0.50 −1.00

438 486 534 582 630 678

wavelength [nm]

Rodagon-WA 1:4/f=80 mm

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.

Rodagon-WA 1:5.6/f=120 mm

MTF at ratio 6x f/ 5.6

MTF [%] at 2.5 5.0 10.0 20.0 Lp/mm

half film diagonal [mm]

MTF at ratio 6x f/ 11

MTF [%] at 2.5 5.0 10.0 20.0 Lp/mm

half film diagonal [mm]

—— sagittal, × Diffraction limited value

------ meridional, ⊖ Diffraction limited value

relative light fall-off at ratio 6x

f/ 5.6 f/ 8.0 1-cos⁴ f/11.0 f/16.0

relative light fall-off [f-stops]

half film diagonal [mm]

Distortion at ratio 15x to 4x

M=15x M=10x M= 6x M=4x

distortion [%]

half film diagonal [mm]

Longitudinal color aberration at ratio 6x

longitudinal color aberration [mm]

wavelength [nm]

Named frequencies [line pairs/mm] in modular transfer function (MTF) as well as diagrams of relative light fall-off, distortion and longitudinal color aberration refer to film plane.